

## ASSEMBLY FOR RETAINING A FOOT ON A SPORT ITEM

The present invention relates to the field of assemblies for retaining a foot on a sport item, and  
5 concerns more particularly an assembly for articulated and adjustable retention which permits introducing and withdrawing his foot or feet instantaneously, for reasons of safety and practice relative to each sport.

Such assemblies are adapted to be used on roller  
10 boards, surfboards and snowboards, and other sport items. The practitioners of these sports constantly seek to execute new aerial maneuvers, whose limiting factors are the amplitude of the leap and the difficulty of keeping the sport item beneath the feet. It is a question in this  
15 approach, of enjoying the sensations and capabilities of execution of aerial maneuvers known for surf and snow, the feet of the practitioner being fixed to the board.

Existing holding systems are limitative and have not proven themselves in practice on all sport items, on roller  
20 boards for example.

The closure system constituted by two straps hooking to each other by means of their textile fibers, of the "Velcro" type, of which one is fixed below the shoe and other on the board, prevent the user from being able to  
25 reposition his feet to correct a change of bearing, and the disengagement of the board during poor reception is uncertain, this system is thus dangerous. Moreover, this material has a rapid deterioration, the adhesion of the practitioner to his board becoming rapidly too weak to  
30 permit carrying out aerial figures.

The "foot-straps" used on sailboards, have been tried on other sport items, but the practitioner must raise his

feet and then lower them one by one in the straps, often with difficulty. Thus, this tricky operation requires great vigilance of the practitioner, sufficiently concentrated on acrobatics that he wishes to accomplish.

5 The disengagement of the feet is also very uncertain.

In other devices, foot chocks are disposed on the outside of the feet but cover only a small region of the shoes, and have been tried without success, the user having to exert force on his feet

10 by spacing his legs, so that the board remains held. This exerted force troubles the practitioner and prevents the performance of acrobatics.

The invention has for its object in the first instance, permitting a lateral intrusion which is easy and  
15 instantaneous, of the foot into the retention assembly, such that the practitioner remains in contact with the sport item without loss of equilibrium. The devices must perform good holding of the feet, without the user having performed a control action of the holding of his board  
20 which can upset the execution of his aerial maneuver, whilst keeping easy disengagement of the feet, during increases of speed by successive pressing of a leg or during a likely fall so as to maintain his safety.

The invention has particularly for its object to  
25 adjust itself on the feet of different practitioners, in the position that they wish to adopt on their sport item, by means of various adjustments.

According to the invention, this object is achieved, the holding assembly comprises according to a first  
30 characteristic a so-called shell having an ergonomic circular curve, having the shape of the top of a foot, which comprises an upper raised end. The so-called tongues

of said shell come into connection and pivot about the ensleeved axis in the bore of said plate. Two torsion springs mounted on opposite sides of the axle, a foot lodged in said shell, the other foot immobilized in rotation against said plate, permit holding an adjustable pressure of said shell on the introduced foot of the practitioner. The upper raised end of said shell and the set of tensioning of the torsion springs, permit said shell to rise when the user desires to introduce or withdraw his feet from the devices.

According to a second characteristic, the holding assembly is comprised by four members adjustable relative to each other, which permit the user to adjust said shells on his feet, by manipulation of the associated pins to the different possible adjustments. Said plate comprises a notched surface which mates in the notched region of said upper disc and permits an adjustment in translation of said shell relative to said base.

Said upper disc arranged between said plate and said base, comprises on its other surface a circular notched ring which engages with the circular notched ring of the upper portion of said base and permits adjustment in rotation of said shell relative to said base. Said lower disc mounted on the lower portion of said base is fixed to the board of the practitioner and comprises a circular notched ring which engages with the circular notched ring of the lower portion of the base which permits adjustment in rotation of the device relative to the board.

The retaining assembly designed according to the invention has a certain number of advantages. The upper raised end of said shell and the tensioning provided by the torsion springs permits to said shell to rise, as well as a

lateral intrusion of the foot into the device being thus possible, as the sole means of avoiding any loss of balance of the user. The ergonomic curve which said shell has and the pressure which it exerts on the top of the foot introduced into the assembly, thanks to the energy of rotation transmitted by the torsion springs, gives rise to efficacious holding of the sport item on the user. The practitioner is thus free in his movements without having to give care to exert a counterforce on the feet, so as to remain held in the retention assemblies. The adjustability intention of the torsion springs also permits said shells to rise when the practitioner desires to withdraw his feet from the devices, during increase of speed by pressing successively a leg or during probable falling so as to maintain his safety.

The positioning of the feet of the torsion springs on said plate, permits the user to adjust the initial position of said shell and hence to regulate the force exerted by said shells on his feet, according to his level and his comfort. The openings of the upper portion of said plate and the tongues of said shell, permit changing the torsion springs easily.

The lower portion of the device on which said shell rests, is constituted by four notched members, adjustable relative to each other, and hence this device offers the user a large number of possible adjustments of said shell on his foot, in a simple and rapid manner by manipulation of the associated pins.

An adjustment in rotation of the device relative to the item, by means of the notched circular rings of the lower disc of the lower portion of the base, will permit

the practitioner to position the angle of opening of his feet as is comfortable.

5 An adjustment in rotation of said shell relative to said base, by means of the circular notched rings of said upper disc and the upper portion of said base, will permit the user to adjust said shell as a function of the angle of his foot, according to the type of shoe which he uses.

10 An adjustment in translation of said shell relative to said base, by means of the notched surfaces of the upper disc and of said plate, permit the user to adjust the height of said shell to the size and type of the shoe which he uses.

The accompanying drawings show the invention:

15 Figures 1 and 2 show two perspective views of each surface of said base of the device of the invention.

Figure 3 is a left side view of said shell of the device of the invention.

Figure 4 is a top perspective view of said shell of the device of the invention.

20 Figures 5 and 6 are two perspective views of each surface of said plate of the device of the invention.

Figures 7 and 8 are two perspective views of each surface of said upper disc of the device of the invention.

25 Figures 9 and 10 are two perspective views of each surface of said lower disc of the device of the invention.

Figure 11 is a perspective view of the flexure mechanism of the device of the invention.

Figure 12 is an exploded perspective view of the device of the invention.

30 Figure 13 is a perspective view of a sport item on which are mounted two retention assemblies for a foot.

Figure 14 is a perspective view of the retention assembly and of the kinematics of the various adjustments of the device of the invention.

Figure 15 shows two views in perspective of a modified  
5 mechanism for flexure of the device of the invention.

Figure 16 is a perspective view of a modification of the immobilization mechanism of the springs of the device of the invention.

Figure 17 is a perspective view of a modification of  
10 the device of the invention adapted for practice on the surf.

As shown in Figure 13, two feet (33) are respectively held in the removal manner on an item (14) with the help of a first (60) and a second (61) retention assembly. In  
15 known manner, the item (40) extends longitudinally between a first (41) and a second (42) end, and transversely between a first (43) and a second (44) edge.

Each retaining device (60, 61) is oriented transversely relative to the item (40). For reasons of  
20 convenience, only the retention assembly (60) is described hereafter, the second being of symmetrical construction.

With reference to the designs, the retention assembly (60, 61) comprises a so-called base (1), reinforced by ribs (28). Said base (1) comprises on its upper portion (80),  
25 which portion rests on the item (40), a first region (21) in the form of a circular notched ring, adapted to mate with the circular notched ring (23) of said lower disc (2). The base (1) is retained on the item (40) with the help of said lower disc (2), itself retained on the item (40) by  
30 means represented by screws (70) which pass through openings (15) of said lower disc (2). Said base could be held on the item (40) otherwise. Said lower disc (2)

permits adjusting the position of said base (1) relative to the item (40), by rotation (34) about an axis Oz and if desired also in translation (65, 66) according to the desired position on the item (40).

5        On the other hand, said base (1) comprises on its upper portion (81), a second region (22) in the form of a notched circular ring, adapted to mate with the notched circular ring (13) on the first surface (85) of said upper disc (3), this system associated with the two oblong  
10    circular holes (14) which are associated with said upper disc (3), adapted to receive the means shown by pins (71) which pass through the openings (20) of said base (1), thereby permitting the positional adjustment of said upper disc (3) relative to said base (1) in rotation (36), and  
15    hence carrying out an adjustment in rotation (36) of said shell (5) on the foot (33) relative to said base (1) about the axis Oy.

      The second surface (86) of said upper disc (3) comprises a notched surface (16), with which the notched  
20    surface (19) of said plate (4) engages. This system, associated with the oblong rectangular hole (18) on said disc (4), adapted to receive the means shown by pins (72) which pass through the two openings (17) of said plate (4) relative to said disc (3) in translation (35), and hence to  
25    carry out an adjustment in translation (35) of said shell (5) on the foot (33) relative to said base (1) along the axis Oz.

      Said plate (4) comprises on its upper portion a bore (9) adapted to receive the axle (6) on which said shell (5)  
30    pivots into connection. Said shell (5) comprises on opposite sides of its lower portion emplacements (30)

adapted to receive the feet (25) of the torsion springs (7).

Said plate (4) comprises on opposite sides of its upper portion, emplacements characterized by a flat and roughened surface (29) which permits immobilization of the feet (36) of the torsion springs (7) mounted on the axle (6), when the means represented by nuts (10) on the screw-threaded axle (6) are gripped. Of course the means represented by the nuts (10) could be represented by clips (68) and the flat and roughened surface (29) could be replaced by a notched surface (69) in which the feet (26) of the torsion springs (7) would be immobilized as shown in the figure, or any other system permitting immobilization of the foot (26) of the torsion spring (7) against said plate (4).

When the means represented by nuts (10) are unscrewed, the positioning of the feet (26) of the torsion springs (7) permits adjusting the initial position of said shell (5) relative to said plate (4) by rotation (67) about the axis Ox. Said plate (4) comprises on opposite sides of its upper end, openings (32) suitable for the passage of the torsion springs (7) to be able to replace them.

As shown in Figure 3, said shell (5) seen in profile, comprises a first ergonomic convex circular curve (12) tangent to a second raised concave circular curve (11). During lateral intrusion (38) of the foot (33) of the practitioner at the raised circular curve (11) of the upper end of said shell (5), the torsion springs (7) become tensioned (37) and said shell (5) rises. Said tongues (46) of said shell (5) come into pivotal connection about the axle (6) ensleeved in the bore (9) which has said tongues



(47) of said plate (4) and forms the articulation about the axis Ox.

When the foot (33) is completely introduced into the retention assembly (60, 61) at the level of the ergonomic  
5 circular curve (12) which matches the shape of the foot (33), the torsion springs (7) then free their energy rotation (39) to said shell (5), which exerts a pressure (39) on the foot (33) of the practitioner.

These members can be made from plastic material such  
10 as polypropylene or polyethylene and/or of composite materials.

According to a modification, said base (1) of the retention assembly (58) can be designed in two separate parts (56, 57), such that the lower portion (57) which  
15 rests on the item (40) will be joined by a pivotal connection to the upper portion (56), by means of a screw-threaded axle (50) on which two torsion springs (51) are mounted, the feet (52) disposed in the positions (53) which have the two portions of said base (1), such that the  
20 tension setting (54) of the torsion springs permits the retention assembly (58) to flatten (54) during sports such as surf or the practitioner lies along the item (40) then returns (55) to initial position when the practitioner rises.

25 According to particular modes of embodiment, said shell (5) and said plate (4) of the retention assembly (90) can form a monobloc device (92) and the pivotal connection can be replaced by a portion of this monobloc device, a zone of least thickness (91) forming the articulation.